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PRESSES

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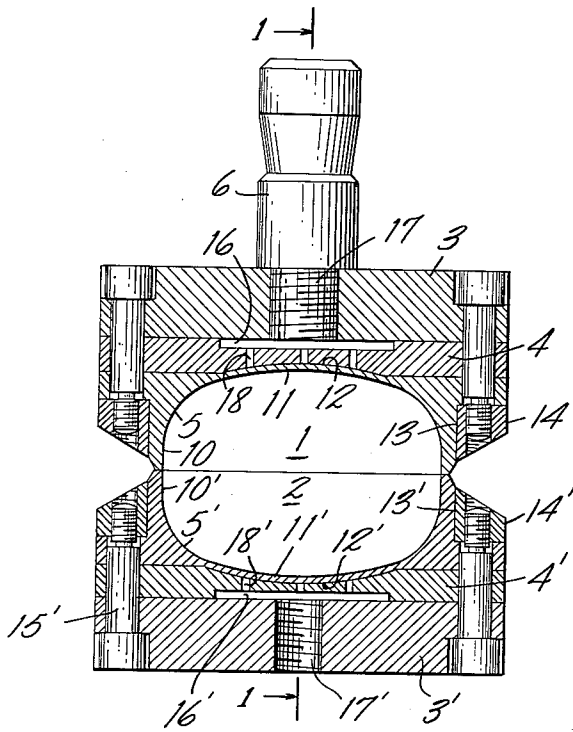


FIG. 3

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PRESSES

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7 Claims. (Cl. 25—10)

This invention relates to presses, and more particularly to a new and improved method and apparatus for producing objects from plastic material, such as soap.

Presses of the type to which the present invention relates usually embody two cooperating dies made of such material as, for example, acid-resistant bronze. The surface of each die is highly polished and is capable of producing soap tablets having unblemished, high-gloss major surfaces. However, it is difficult to remove each finished soap tablet from the die and even when the die is shaped to facilitate disengagement, the tablet pressed by it has to be disengaged by hand. It has been proposed to overcome this disadvantage by providing the die with an ejector, the operative end of which forms part of the die surface. However, this interrupts the smooth surface of the die, and each tablet pressed by it has a corresponding "edge" on a major surface.

Accordingly, it is an object of the present invention to provide a press and a pressing process for producing tablets having unmarked major surfaces, which tablets do not require disengagement from the die by hand.

Generally, the present invention provides a press having two cooperating dies, at least one of which is provided with a continuous inside surface of resilient material, and means for deforming that surface.

Also, the present invention provides a process for producing tablets of plastic material which comprises pressing a quantity of that material between two cooperating dies, at least one of which is provided with a continuous inside surface made of resilient material, and disengaging the tablet from that die by deforming its inside surface.

Preferably, both dies are provided with the continuous inside surface of resilient material and means for deforming it, so that when a tablet of plastic material is produced it is disengaged by deforming the inside surfaces of both dies. In one preferred embodiment of the invention the die with the surface to be deformed comprises a backing member of substantially rigid material and an inside lining of resilient material. Preferably the deformation of the inside surface of resilient material is in the region of the center of the die surface which faces the other die during pressing and towards the other die. The inside lining is accordingly with advantage substantially thinner in the region of the center of the die surface facing the other die during pressing than at the periphery of that surface to facilitate deformation in that region; preferably this thinner portion constitutes a minor portion only of that die surface.

The deformation is effected preferably by fluid pressure as, for example, pneumatic or hydraulic means. It is possible to apply such deforming pressure even before the dies are separated, so that on separation the tablet lies freely on the die surface; when this is done, the operating conditions will need, of course, to be such that the desired shape of the pressed tablet is retained; for instance the pressure used in the shaping process will

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be so much greater than the deforming pressure that deformation is delayed until the shaping pressure is released by separation of the dies. Where the surfaces of both dies can be deformed, deformation of one surface can be effected before deformation of the other; for instance disengagement from an upper die can be effected before disengagement from a lower one. Preferably the deformation pressure is applied after the shaping pressure is released by separation of the dies. The deforming pressure can, for example, be applied to that die in which a tablet remains when the dies are separated after the pressing operation.

The resilient material can be made, for example, of synthetic resin shaped by injection moulding. This provides a relatively inexpensive process for producing identical parts having a very small surface. Naturally, the resin used will be one of sufficient strength and elasticity to give an adequate life to the part of the die which it forms. A suitable resin is a nylon having at 23° C. an elastic modulus of 6,000 kg./cm.<sup>2</sup>, a tensile strength of 700 kg./cm.<sup>2</sup>, and a hardness of 87 (Rockwell R scale). Using an inside lining of such a material with at its center an area of 30 x 25 mm. having a thickness of 1 mm., a pressure of one atmosphere will displace the center of the thin area by 2 mm., which is sufficient to disengage a soap tablet from the die.

The various novel features of construction, combination and relation of parts by which the foregoing and other objects are obtained are set forth in detail in the following specification.

The drawings accompanying and forming a part of the specification illustrate one practical commercial embodiment of the invention as applied to the art of making soap tablets. It should be understood, however, that the invention is not limited to this use or to this particular form of structure, as will appear from the scope of the appended claims. In the drawings:

FIGURE 1 shows a longitudinal cross-sectional view of the relevant portion of a press according to the present invention;

FIGURE 2 shows a view in section along the line 2—2 in FIGURE 1; and

FIGURE 3 shows a view in section along the line 3—3 in FIGURE 1.

Referring now to a preferred embodiment of the invention as illustrated in FIGURES 1, 2 and 3 of the drawings which show a press having a top die 1 and a substantially identical bottom die 2, each die includes a bolster or platen 3 and 3' respectively, a support or backing member 4 and 4' respectively, and a surface or lining 5 and 5' respectively. The top platen 3 is provided with a shank 6 by which it is secured to the head of the press and depending from the top platen 3 are two spaced-apart guide pins 7 positioned to slide within bushings 8 projecting upwardly from the bottom platen 3'. The downward travel of the top die is restricted by the provision of a wider part 9 on each pin 7 which meets the bushing 8 when the rims 10 and 10' of the linings 5 and 5', respectively, just touch. Resilience is imparted to the linings 5 and 5' by the relatively thin center portions 11 and 11' such that they can act like membranes. These relatively thin center portions 11 and 11' are supported in the position shown in the drawings by engagement with recesses 12 and 12' in the back-

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ing members 4 and 4', each recess having the desired profile. It will be noted that it is only necessary to provide the backing members with the desired profile at that portion where the lining is very thin. A frame 14 acting within a groove 13 of the lining 5 secures the lining 5 and the backing member 4 to the platen 3. Similarly, a frame 14' secures the lining 5' and the backing member 4' to the lower platen 3' by acting in a groove 13'. These components are clamped together by means of threaded members 15 and 15' passing through the top and bottom platens 3 and 3', respectively, and threaded into the frames 14 and 14', respectively.

The surfaces of the backing members furthest from the membranes or resilient portions of the linings 5 and 5' are provided with recesses or manifolds 16 and 16', respectively. A suitable source of fluid pressure is communicated with these manifolds 16 and 16', respectively, by apertures 17 and 17' in the top and bottom platens 3 and 3', respectively. The backing members are also provided with at least one and preferably a plurality of apertures or ducts 18 and 18' which communicate between the recesses 12 and 12' and the recesses 16 and 16', respectively.

In operation, when a tablet has been pressed, it will remain in engagement with either the top or the bottom die after the press has been opened. By admitting pneumatic or hydraulic fluid pressure to the ducts 18 and 18' the resilient surfaces will be deformed and the tablet will be disengaged. Of course, it is also possible to admit pressure to ducts in both dies at the same time before the press is opened so that the tablet will be resting freely in the bottom die on opening.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. Therefore, it is to be understood that the invention is not limited in its applications to the details of construction and arrangement of parts specifically described or illustrated, and that within the scope of the appended claims it may be practiced otherwise than as specifically described or illustrated.

I claim:

1. A press comprising cooperating die means, a continuous resilient cup-shaped lining on the inside of each cooperating die means, means for forcing the die means together to make a mass of solid plastic material inserted between the die means conform to the shape of the die means, a backing member of substantially rigid material positioned adjacent the resilient lining of each die means for support thereof during a pressing operation, a manifold adjacent each of the rigid backing members on the sides furthest from the resilient linings, each rigid backing member having a plurality of apertures communicating between the respective manifolds and the respective resilient linings, and means for applying fluid pressure to the manifolds to deform the resilient linings and disengage the mass of pressed plastic material therefrom.

2. A press comprising cooperating dies, at least one of which comprises a continuous resilient cup-shaped lining having a diaphragm-like bottom center portion and an annular thickened peripheral portion extending upwardly and outwardly from said bottom center portion, said portions being integral and together forming the inside surface of said die, a backing member of rigid material positioned against said diaphragm-like center portion and said thickened peripheral portion for support thereof during a pressing operation, means for forcing the dies together to make a mass of solid plastic material inserted between the dies conform to the shape of the dies, and means for deforming only the diaphragm-like center portion of the resilient lining away from said backing member.

3. A press comprising cooperating dies, at least one of which comprises a continuous resilient cup-shaped lining having a diaphragm-like bottom center portion and an annular thickened peripheral portion extending upwardly

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and outwardly from said bottom center portion, said portions being integral and together forming the inside surface of said die, a backing member of rigid material positioned against said diaphragm-like center portion and said thickened peripheral portion for support thereof during a pressing operation, means for forcing the dies together to make a mass of solid plastic material inserted between the dies conform to the shape of the dies, and fluid pressure means for deforming only the diaphragm-like center portion of the resilient lining away from said backing member.

4. A press according to claim 3 wherein said fluid pressure means comprises a manifold adjacent said rigid backing member on a side thereof removed from said diaphragm-like center portion for receiving a fluid under pressure, said backing member having at least one aperture for fluid communication between said diaphragm-like center portion of the resilient lining and said manifold.

5. A press comprising cooperating dies, each die comprising a resilient cup-shaped lining having a diaphragm-like bottom center portion and an annular thickened peripheral portion extending upwardly and outwardly from said bottom center portion, said portions being integral and together forming a continuous surface which constitutes the entire inside surface of said die, a backing member of rigid material positioned against each said diaphragm-like center portion and said thickened peripheral portion for support thereof during a pressing operation, the lining being in face-to-face contact with the backing member so as to be readily separable therefrom, a manifold adjacent each said rigid backing member on the side furthest from said resilient lining, each said rigid backing member having a plurality of apertures communicating each manifold with the diaphragm-like center portion of its respective resilient lining, and fluid pressure means in communication with each said manifold.

6. A press comprising cooperating dies, said cooperating dies comprising first and second platen members capable of movement relative to each other, a first backing member of substantially rigid material attached to said first platen, a second backing member of substantially rigid material attached to said second platen, first and second continuous resilient cup-shaped linings each having a diaphragm-like bottom center portion and an annular thickened peripheral portion extending upwardly and outwardly from said bottom center portion, said linings being integral and together constituting substantially the entire inside surface of said dies, each of said backing members being positioned to provide a rigid support for each said diaphragm-like center portion and said thickened peripheral portion during a pressing operation, each of said linings being in face-to-face contact with the corresponding backing member so as to be readily separable therefrom, a first manifold formed between the first platen member and the first backing member, a second manifold formed between the second platen member and the second backing member, each of said first and second platen members having means for communicating a source of fluid pressure with each said manifold, and each of said first and second backing members having means communicating each respective manifold with the respective diaphragm-like center portion of each resilient lining.

7. A press comprising cooperating dies, at least one of which comprises a continuous resilient cup-shaped lining having a diaphragm-like bottom center portion and an annular thickened peripheral portion extending upwardly and outwardly from said bottom center portion, said portions being integral and together forming the inside surface of said die, a backing member of rigid material positioned against said diaphragm-like center portion and said thickened peripheral portion for support thereof during a pressing operation, the lining being in face-to-face contact with the backing member so as to be readily

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separable therefrom, and means for deforming only the diaphragm-like center portion of the resilient lining away from said backing member, said diaphragm-like center portion constituting only a minor part of the inner surface of said lining.

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